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(54) WASHABLE PRESSURE-SENSITIVE ADHESIVE AND TACKY PRODUCT

(57)Abstract:

PURPOSE: To obtain the subject adhesive, applicable without using a solvent or a solvent medium, readily washable with water and recovering the tack after drying even when washed with water by reacting a radiation curing resin with a specific polyglycol compound according to exposure to radiation.

CONSTITUTION: This adhesive comprises a polymer, composed of (A) a radiation curing resin and (B) a polyethylene glycol compound having a cross-linked structure and obtained by reacting the components according to exposure to radiation. Furthermore, the component (B) is the polyethylene glycol compound, prepared by reacting (i) polyethylene glycol with (ii) any one or more of a polyvalent carboxylic acid (anhydride), a lower alkyl ester of the polyvalent carboxylic acid and a polyvalent isocyanate and finely pulverized to preferably  $\leq 100 \mu\text{m}$  particle diameter. The component (B) is used in an amount of preferably 0.5-100 pts.wt. based on 100 pts.wt. component (A) and (C) an organic or an inorganic pigment having 1-20  $\mu\text{m}$  average particle diameter is used in an amount of preferably 0.5-100 pts.wt. based on 100 pts.wt. total amount of the components (A) and (B).

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the pressure sensitive adhesive constituent of the radiation-curing mold which does not need the water or the solvent as a solvent or a dispersion medium. It is related with the \*\*\*\* pressure sensitive adhesive in which exfoliation of an adhered object is possible and after desiccation has adhesiveness again by rinsing in more detail and which can be washed, and its adhesion product.

[0002]

[Description of the Prior Art] The pressure sensitive adhesive (binder) is conventionally used in many fields, such as a tape for a package nominal member and PD labels, such as an industrial use tape, a masking tape, and a gummed tape, a goods price tag label, a display label, a medical-application tape, a seal, a toy, and other stationery. Moreover, in recent years, fields, such as an adhesion roll which cleans the SOL mat and carpet which are put on the inlet port of a clean room, a carpet, etc., and a simple adhesion roll from which the dust of clothes and the dust of OA equipment are removed, are also used. The adhesive property or adhesiveness required of a pressure sensitive adhesive is broad from the adhesive property of the level almost near adhesives to a temporary simple adhesive property which is looked at by adhesion tag paper.

[0003] Generally the conventional adhesion products of exfoliating, once using for adhesion cannot but be rare, and the field restricted [ paper / a masking tape, / adhesion tag ] must be used for such an application. Also in the adhesion product for these exfoliations, generally it is throwing away, and the reuse of the adhesion product which pasted up and exfoliated once was hardly repeated and carried out. For this reason, the pressure sensitive adhesive made in order to carry out a repeat reuse, or the pressure sensitive adhesive constituent is not obtained by the conventional approach.

[0004] It is main, and the configuration which added the tackifier, the cross linking agent, the softener, and the bulking agent to nature or a synthetic polymer dissolves or distributes these to organic solvents, such as water, and alcohol, ethyl acetate, toluene, presupposes that it is liquefied, applies and dries to base materials, such as paper and a film, and the conventional pressure sensitive adhesive is used as a pressure-sensitive glue line. Apart from this, a solid polymer is originally fused at an elevated temperature like a hot melt mold pressure sensitive adhesive, and there are some which apply to a base material, cool as it is, solidify, and form a pressure-sensitive

glue line. by the former approach, when you use porous base materials, such as paper, in order to prevent osmosis of the pressure sensitive adhesive to the inside of a base material, it is indispensable to prepare a barrier layer and an under coat layer, and make it which approach -- since it not only uses great energy, but a heating process was in desiccation of a solvent or melting of a pressure sensitive adhesive to a base material, direct processing to the low synthetic-resin sheet of softening temperature or the thermal paper which carries out sensible-heat coloring was impossible. Furthermore, there was a trouble that bridge formation did not advance gradually under the effect of the cross linking agent contained in a pressure sensitive adhesive, or the stability with the passage of time as a product with which the solvent or solvent which remains in a pressure sensitive adhesive layer is lost gradually -- adhesiveness changes to a twist especially -- was not enough.

[0005] Moreover, although research and development in the pressure sensitive adhesive of the type which carries out polymerization bridge formation by irradiating radiations, such as ultraviolet rays and an electron ray, is done besides the pressure sensitive adhesive of the type which uses the conventional solvent (JP,5-32437,B) When the amount of radiation irradiation was superfluous, the polymerization of a pressure sensitive adhesive progressed too much, adhesive ability fell extremely, when a polymerization was carried out to extent with moderate adhesive ability, aging after creation was remarkable, and there was a problem of the adhesive ability falling, when a certain period passes after creation. Although the hydroquinone monomethyl ether and a phenothiazin system compound were generally contained in radiation hardenability resin as a polymerization inhibitor, in this way, the compound which already exists from before radiation irradiation had the problem of \*\*\*\*\* or the passage of time coloring the polymerization prevention function by radiation irradiation, and was inadequate for solution of the above troubles.

[0006]

[Problem(s) to be Solved by the Invention] Therefore, the technical problem which this invention tends to solve can be applied with a non-solvent and a non-solvent. Rinsing of the adherend and contamination which do not dry, do not deteriorate at a long period of time, are excellent in stability with the passage of time even if it hardened by radiation irradiation, it discovered required adhesiveness and the obtained pressure sensitive adhesive layer is exposed into air, and adhered to the front face is easy. And even if it rinses, after desiccation is related with the pressure sensitive adhesive used as the adhesion product which has adhesiveness again, and its raw material. Furthermore, after hardening by radiation irradiation, it is related with the pressure sensitive adhesive with which degradation of adhesive ability with the passage of time serves as an adhesion product improved sharply and its raw material by preventing advance of the polymerization of the radiation-curing nature resin by the passage of time by making inactive the unreacted radical kind shut up into the resin constituent.

[0007]

[Means for Solving the Problem] this invention persons came to invent the pressure sensitive adhesive which can be washed and adhesion product of this invention, as a result of studying wholeheartedly a means to solve the above-mentioned problem.

That is, it is invention of the pressure sensitive adhesive characterized by using as a principal component the polymerization object which consists of (1) radiation hardenability resin and a polyethylene-glycol compound which has (2) structure of cross linkage, reacts by radiation irradiation, and is obtained.

[0008] It is desirable that the polyethylene-glycol compound which has this structure of cross linkage is a polyethylene-glycol compound reacted and obtained in a polyethylene glycol and one or more kinds of compounds chosen from the group of polyvalent carboxylic acid, polyvalent carboxylic anhydride, polyvalent-carboxylic-acid low-grade alkyl ester, and multiple-valued isocyanate. Furthermore, it is desirable that the polyethylene-glycol compound which has this structure of cross linkage is pulverized by the particle size of 100 micrometers or less.

[0009] In this pressure sensitive adhesive, the 0.5 - 100 weight section comes out [ the weight ratio of radiation hardenability resin and the polyethylene-glycol compound which has the structure of cross linkage / this polyethylene-glycol compound ] comparatively to this radiation hardenability resin 100 weight section, and a certain thing is desirable.

[0010] Moreover, it is desirable to carry out 0.5-100 weight section content of the organic or inorganic pigment with a mean particle diameter of 1-20 micrometers to the total amount 100 weight section of a polyethylene-glycol compound which has radiation hardenability resin and the structure of cross linkage.

[0011] Moreover, in this pressure sensitive adhesive, after carrying out the polymerization of the resin constituent which consists of radiation hardenability resin and a polyethylene-glycol compound which has the structure of cross linkage by radiation irradiation, it is desirable to process this resin constituent with radical polymerization inhibitor.

[0012] Furthermore, in the adhesion product which has a pressure-sensitive glue line at least on one side on a base material, it is invention of the adhesion product which hardens the pressure sensitive adhesive constituent with which a pressure-sensitive glue line uses as a principal component the (1) radiation hardenability resin 100 weight section, and the polyethylene-glycol compound 0.5 - the 100 weight sections which have (2) structure of cross linkage by radiation irradiation, and after carry out the polymerization of this pressure sensitive adhesive constituent by radiation irradiation, it is desirable that this pressure sensitive adhesive constituent is process with radical polymerization inhibitor.

[0013] Moreover, it is desirable to use an electron ray or ultraviolet rays as a radiation in this invention.

[0014] The pressure sensitive adhesive which is obtained by this invention and which can be washed is hereafter called a "\*\*\*\* pressure sensitive adhesive", and it explains to a detail. The pressure sensitive adhesive which hardens this invention by electron beam irradiation about the pressure sensitive adhesive constituent of the electron ray hardening mold which does not need the water or the solvent as a solvent or a dispersion medium, and is obtained Exfoliation of an adhered object is possible by rinsing, without drying and deteriorating at a long period of time, even if it had

adhesiveness required at the time of hardening and the pressure sensitive adhesive layer is exposed into air. Or washing of the contamination adhering to a front face is possible, and after desiccation is related with the pressure sensitive adhesive constituent used as the pressure sensitive adhesive which has adhesiveness again and which can be washed, and its raw material.

[0015] It is characterized by hardening the \*\*\*\* pressure sensitive adhesive of this invention by radiation irradiation, and the main part of the presentation consists of polyethylene-glycol compounds which have radiation hardenability resin and the structure of cross linkage.

[0016] Although the compound which has an ethylene nature unsaturated bond is mentioned as radiation hardenability resin used for this invention, if it roughly classifies, without being based on the number of polymerization nature functional groups, it can classify as follows.

(1) The acrylate (meta) (2) aliphatic series of the polyhydric alcohol of aliphatic series, an alicycle group, aromatic series, and aroma aliphatic series, and (Pori) alkylene glycol, An alicycle group, aromatic series, To the polyhydric alcohol of aroma aliphatic series, alkylene oxide The polyhydric alcohol made to add (Meta) Acrylate (3) (Pori) ester (meta) acrylate (4) (Pori) Urethane (meta) acrylate (5) epoxy (meta) acrylate (6) (Pori) amide (meta) acrylate (7) (meth)acryloyloxy alkyl phosphoric ester And the vinyl system or diene series (9) monofunctional (meta) acrylate which has the salt (8) (meth)acryloyloxy radical at a side chain or the end, The monochrome which has the cyano compound (11) ethylene nature unsaturated bond which has N-vinyl pyrrolidone, N-vinyl formamide, and an acryloyl (meta) compound (10) ethylene nature unsaturated bond, or polycarboxylic acid, And those alkali-metal salts, ammonium salt, (12) vinyl lactams, such as an amine salt And the ester (16) ethylene nature unsaturated bond of the alcohol which has the ether which has a polyvinyl lactam compound (13) acrylamide compound (14) ethylene nature unsaturated bond (Pori), and its ester (15) ethylene nature unsaturated bond The aromatic compound (18) (meth)acryloyloxy radical which has one or more ethylene nature unsaturated bonds, such as polyalcohol which it has and the ester (17) styrene, and a divinylbenzene, a side chain, Or the silicone compound (20) amino denaturation which has the ORGANO siloxane system compound (19) ethylene nature unsaturated bond which it has at the end (Pori), Or the polymer or oligo ester (meta) acrylate denaturation object [0017] of a compound given in carbamate denaturation (meta) acrylate (21) above-mentioned (1) - (20) The polyethylene-glycol compound (called a polyethylene oxide compound) which has the structure of cross linkage used for this invention reacts, and one or more kinds of compounds chosen from the group of a polyethylene-glycol compound, polyvalent carboxylic acid and polyvalent carboxylic anhydride, polyvalent-carboxylic-acid low-grade alkyl ester, and multiple-valued isocyanate are obtained. Hereafter, the polyethylene-glycol compound which has the structure of cross linkage is only called a bridge formation polyethylene-glycol compound. When polyvalent carboxylic acid, polyvalent carboxylic anhydride, polyvalent-carboxylic-acid low-grade alkyl ester, and multiple-valued isocyanate are a divalent carboxylic acid, a divalent carboxylic anhydride, divalent carboxylic-acid low-grade alkyl ester, and divalent isocyanate, respectively, it is desirable to use it, after it mixes a cross linking agent to the system of reaction or constructs a bridge over a polyethylene-glycol compound by irradiate an electron ray or a gamma ray,

since the polyethylene-glycol compound obtain by the reaction may become the straight chain-like giant molecule which considered frames, such as these divalent carboxylic acids, as a core or junction.

[0018] The polymerization of the ethyleneoxide is carried out to a polyethylene-glycol compound by using as a raw material the organic compound which has two active hydrogen radicals, for example, ethylene glycol, a diethylene glycol, propylene glycol, dipropylene glycol, 1,4-butanediol, 1,6-hexanediol, neopentyl glycol, bisphenol A, a polyethylene glycol, a polypropylene glycol, a polytetramethylene glycol, an aniline, a butylamine, an octyl amine, a lauryl amine, hexylamine, etc., and it is obtained.

[0019] It is also possible to mix and use alpha olefin oxide, such as other alkylene oxide, i.e., propylene oxide, 1, 2-epoxy butane, 1, 2-epoxy pentane, 1, 2-epoxy heptane, 1, 2-epoxy octane, 1, and 2-epoxy nonane, styrene oxide, glycidyl ether, etc. for the ethyleneoxide used for a polymerization if needed. As for the amount of the ethyleneoxide contained in all alkylene oxide, it is desirable that it is 80% or more in a mole ratio.

[0020] The polyvalent carboxylic acid made to react with a polyethylene-glycol compound in this invention, or its anhydride, or as an example of the low-grade alkyl ester and multiple-valued isocyanate For example, a malonic acid, a succinic acid, a maleic acid, a fumaric acid, an adipic acid, A sebacic acid, a phthalic acid, isophthalic acid, a terephthalic acid, an itaconic acid, Trimellitic acid, pyromellitic acid, 7, the 12-dimethyl -7, 11-OKUTA deca diene -1, 18-dicarboxylic acid, 7, the 12-dimethyl-OKUTA decane -1, 18-dicarboxylic acid, or these dimer acid, Or these acid anhydrides, these Monod, or G methyl ester, Monod or G ethyl ester, Monod, or G propyl ester, Trimethyl hexamethylene di-isocyanate, tolylene diisocyanate, They are hexamethylene di-isocyanate, xylylene diisocyanate, diphenylmethane diisocyanate, tolidine di-isocyanate, isophorone diisocyanate, dicyclohexyl diisocyanate, naphthalene diisocyanate, etc.

[0021] With the bridge formation polyethylene-glycol compound of this invention, it is manufactured using the catalyst for condensation reactions usually preferably used in a polyethylene-glycol compound, polyvalent carboxylic acid or its anhydride, or its low-grade alkyl ester by performing esterification or an ester exchange reaction under ordinary pressure or reduced pressure in the reaction temperature of 120-250 degrees C.

[0022] About the degree of cross linking of the bridge formation polyethylene-glycol compound of this invention, it can check with the gel molar fraction at the time of using water as a solvent. If it distributes to a bridge formation polyethylene-glycol compound in sufficient quantity of water (they are 2000 times at a weight ratio as a standard), the solid content which stirred water temperature in the condition of having kept it warm at 40 degrees C for 48 hours, and was filtered and obtained is dried and it asks for the rate to the weight of the original polyethylene-glycol compound by the percentage, it can ask for the gel molar fraction used as the standard of cross-linking. As a bridge formation polyethylene-glycol compound used for the application of this invention, a certain thing has a desirable gel molar fraction 50% or more. It is desirable that stick a \*\*\*\* pressure sensitive adhesive side on a pasted up object, and

a gel molar fraction uses 70% or more of bridge formation polyethylene-glycol compound especially in order not to make an adherend pollute with a \*\*\*\* pressure sensitive adhesive, if exfoliating is possible. They must not be water solubility from a viewpoint of washing with water and acquiring adhesiveness repeatedly, and they must be insoluble to water as a gel molar fraction shows these bridge formation polyethylene-glycol compounds.

[0023] As a \*\*\*\* pressure sensitive adhesive, when radiation hardenability resin is mixed with a bridge formation polyethylene-glycol compound, in radiation-curing nature resin, the bridge formation polyethylene-glycol compound is insoluble, and is swollen. Radiation hardenability resin is incorporated in the network structure which the bridge formation chain of a polyethylene-glycol compound constitutes, and it swells in the analog to which the gestalt of the bridge formation polyethylene-glycol compound before mixing reaches one 1000 times the number [ dozens - ] of this by the volume. For this reason, a spreading side when the viscosity of a \*\*\*\* pressure sensitive adhesive performs spreading to a base material to the particle size of a bridge formation polyethylene-glycol compound again is greatly influenced by the gestalt of a bridge formation polyethylene-glycol compound, it becomes difficult to make a spreading side into homogeneity, if a bridge formation polyethylene-glycol compound is not a uniform configuration, and control of adhesion becomes difficult.

[0024] In this invention, it is characterized by using the bridge formation polyethylene-glycol compound pulverized by the particle size of 100 micrometers or less. After mixing with radiation-curing nature resin, even if it swells, viscosity becomes easy [ a difference not becoming high and acquiring the homogeneity of a spreading side from the homogeneity of particle size ], and can control adhesion by pulverizing as powder with a particle size of 100 micrometers or less easily. The particle size as used in the field of this invention is JIS. The standard sieve with a nominal dimension of 100 micrometers or less specified by Z8801 is used, and it is JIS. When R5201 is followed and a sieve division is performed, it considers as the magnitude of the particle which can pass this sieve. In addition, whichever it is used [ of a wire sieve and a plate sieve ] for a standard sieve, it does not interfere.

[0025] Pulverizing of a bridge formation polyethylene-glycol compound is performed using the grinder generally used. concrete -- a ball mill, an impact pulverizer, a jet pulverizer, and a column -- a type mill, a colloid mill, a ring roll mill, a stamp mill, a rod mill, a cone mill, a roll crusher, a screw secondary crusher, an edge runner, etc. are mentioned, and if required, after performing crushing which used the jaw crusher, the joy rate crusher, the hammer mill, etc., the approach of pulverizing further may be used. Moreover, as an approach of grinding, although dry process and a wet method are mentioned, since the bridge formation polyethylene-glycol compound of this invention has absorptivity, the dry process from which change of physical properties cannot arise easily due to a grinding process is used preferably. Furthermore, in order to grind, the so-called frost-shattering method which grinds by freezing a bridge formation polyethylene-glycol compound may be used.

[0026] Before applying to a base material the bridge formation polyethylene-glycol compound and radiation-curing nature resin which were pulverized by the particle size of 100 micrometers or less after mixed preparation, distribution which used various dispersers may be performed. Distribution is performed by throwing a bridge



formation polyethylene-glycol compound and radiation-curing nature resin into coincidence or individual sequential one at a disperser. As a disperser used, they are 2 rolls, 3 rolls, a ball mill, a Sand grinder, DISUPA, a high-speed impeller disperser, a high speed mixer homogenizer, etc., for example.

[0027] Moreover, the \*\*\*\* pressure sensitive adhesive of this invention can be made to contain a pigment. In this invention, a pigment component raises the blocking resistance of a \*\*\*\* pressure sensitive adhesive, and the effectiveness which can flush easily the dust which adhered to the adhesives front face in washing by water etc. is demonstrated.

[0028] Although any of an inorganic pigment and an organic pigment are sufficient and a silica, a kaolin, clay, a calcium carbonate, an aluminum hydroxide, titanium oxide, a zinc oxide, a glass particle, milt balun, a melamine resin particle, a benzoguanamine resin particle, a styrene resin particle, a polymethyl-methacrylate resin particle, a polyolefin resin particle, a starch grain child, etc. can specifically be illustrated as a pigment contained in the \*\*\*\* pressure sensitive adhesive of this invention, a silica, a glass particle, and the resin particle of an organic pigment system are desirable especially. The compounding ratio of a pigment can be used in the range of the 0.5 - 100 weight section to the sum total weight of the polyethylene-glycol compound which has the radiation hardenability resin which constitutes a \*\*\*\* pressure sensitive adhesive, and the structure of cross linkage, and can be preferably used in the range of 3 - 80 weight section. If there are few pigment components than this rate, blocking resistance cannot demonstrate enough. It becomes difficult and is not desirable to, reduce about [ reducing the adhesive strength and adhesion of a \*\*\*\* pressure sensitive adhesive ] and a water resisting property on the other hand, if this range is exceeded, or to apply to a base material.

[0029] As for the magnitude of the pigment used in this invention, it is desirable that it is in the range of 1-20 micrometers with mean particle diameter. Although it may be larger than this range or the small particle may exist If the mean diameter of a pigment is smaller than this range, blocking resistance cannot fully be discovered, but if larger than this range, the adhesive strength and adhesion of a \*\*\*\* pressure sensitive adhesive may be reduced, or the problem of field reinforcement falling and dropping out of the applied base material may arise.

[0030] Moreover, tackifiers, such as petroleum resin, terpene resin, and rosin system resin, can be mixed and used for the \*\*\*\* pressure sensitive adhesive of this invention in the range which does not block the \*\*\*\*.

[0031] Furthermore, the softener which consists of ester, such as the phthalic ester and phosphoric ester which are used for a common pressure sensitive adhesive, adipate, sebacic-acid ester, and linoleic ester, paraffin, \*\* and vegetable oil, straight mineral oil, silicone oil, etc., an antioxidant, a bulking agent, an ultraviolet ray absorbent, a vulcanizing agent, a cross linking agent, a stabilizer, a coloring agent, etc. can be added and used.

[0032] Especially the base material used for this invention is not regulated in materials, such as paper, a synthetic paper, a wood side, fiber, textile fabrics, a nonwoven fabric, a synthetic-resin side, a synthetic-resin laminated paper, a releasing

paper, a metal side, and a glass side. As synthetic resin, especially a limit does not have polyethylene, polypropylene, polyester, a polyvinyl chloride, a polyvinylidene chloride, polyurethane, polymethacrylate, polystyrene, a polyamide, polyimide, the poly methyl pentene, foaming synthetic resin, Vinylon, nylon, etc. In thickness, it does not change with applications and is not regulated especially. Controlling the wettability of a base material by forms, such as corona treatment, frame processing, ozonization, and support layer spreading, does not interfere at all.

[0033] Moreover, in the form offered, even if the adhesion product which has the \*\*\*\* pressure sensitive adhesive of this invention is the form which the \*\*\*\* pressure sensitive adhesive side exposed, or the form where the \*\*\*\* pressure sensitive adhesive side was covered with the releasing paper, the exfoliation film, etc. if needed, it may be the form piled up several times over like adhesive tape. It also sets to the manufacture approach, it piles up on top of the approach and detachability base material with which a direct \*\*\*\* pressure sensitive adhesive is applied and fixed by the base material with spreading, a \*\*\*\* pressure sensitive adhesive is piled up with a base material after radiation irradiation, a \*\*\*\* pressure sensitive adhesive is laid on top of the approach which exfoliates a detachability base material and is fixed by the base material, or a detachability base material with spreading and a base material, and a polymerization is carried out by radiation irradiation, and even if it uses which approaches, such as the approach of fixing in a base material, it does not interfere.

[0034] The \*\*\*\* pressure sensitive adhesive of this invention can also be applied all over a base material, and can also be applied to some base materials in the shape of a pattern. As for the coverage of a \*\*\*\* pressure sensitive adhesive, it is desirable from an adhesive viewpoint to make it become 1 - 50 g/m<sup>2</sup> with dry weight. About the method of application of a \*\*\*\* pressure sensitive adhesive, no matter what coating machines [ , such as a gravure coating machine, a comma coating machine, U comma coating machine, a multi-roll coater, an air knife coating machine, a blade coating machine, a curtain coating machine, a rod coating machine, a die coating machine, and a micro gravure coating machine, ] it may use, it does not interfere.

[0035] In this invention, in order to make a base material support a \*\*\*\* pressure sensitive adhesive, a polymerization and immobilization are given by making a radiation irradiate, after applying to a base material.

[0036] As an electron ray accelerator used for electron beam irradiation among radiations, although a curtain method, a scanning method, and a doubles can method are employable, it is comparatively cheap and the curtain method with which high power is obtained easily is desirable. 100-1000kV, the acceleration voltage of an electron ray is 150-300kV preferably, and is 0.5 - 30Mrad in an absorbed dose as quantity of radiation. Energy efficiency falls and is not economical, if acceleration voltage runs short of the amounts of transparency of energy in less than 100kV and exceeds 1000kV. Moreover, when quantity of radiation is smaller than this range, the effect of a residual monomer may appear and problems, such as \*\*\*\*\* and a residual to the adherend of a pressure sensitive adhesive, may arise. On the other hand, if there is much quantity of radiation across this range, degradation of about [ that energy efficiency falls ] and a base material may be caused, or bridge formation advances too much and adhesiveness may fall.

[0037] When carrying out the polymerization of the \*\*\*\* pressure sensitive adhesive by UV irradiation among radiations, a polymerization initiator can be blended and used for this \*\*\*\* pressure sensitive adhesive if needed. As an ultraviolet-rays generating method, there are a discharge lamp method, a flash plate method, a laser method, an electrodeless lamp method, etc., and there are a low-pressure mercury lamp, a high-pressure mercury lamp, an extra-high pressure mercury lamp, a metal halide lamp, a pulse xenon lamp, an electrodeless discharge lamp, etc. as a generation source, and a mercury discharge lamp is used suitably especially.

[0038] In case a polymerization is carried out by UV irradiation, ultraviolet rays are absorbed as the polymerization initiator blended and used, and it excites, a radical is generated, it is the thing of the matter which starts radical reaction, and unlike the time of using an electron ray, even if it makes ultraviolet rays irradiate only using radiation hardenability resin, radical reaction does not occur and does not carry out a polymerization (called a photoinitiator). As a polymerization initiator, chloroacetophenones and diethoxy acetophenones Acetophenone systems, such as hydroxy acetophenones and alpha-amino acetophenones, Benzoin systems, such as benzoin ether, a benzophenone system, a thioxan ton system, alpha-acyl oxime ester system, an acyl phosphine oxide system, a GURIOKISHI ester system, Benzyl dimethyl ketal besides compounds, such as azo, methyl-O-benzoyl benzoate, There are compounds, such as a 3-keto coumarin, 2-ethylanthraquinone, a camphor quinone, benzyl, a Michler's ketone, tetramethylthiuram monosulfide, 3, 3', 4, and a 4'-tetrapod (t-butyl par oxycarbonyl) benzophenone.

[0039] A polymerization initiator is chosen from viewpoints, such as affinity with radiation hardenability resin and a bridge formation polyethylene-glycol compound, and fitness with a black light. The amount of the polymerization initiator used is usually used in the range of 0.1 - 5 weight section to the radiation-curing nature resin 100 weight section. When there is less amount of the polymerization initiator used than the above-mentioned range, radiation-curing nature resin can carry out a hardening reaction by UV irradiation, but a cure rate is slow, and since the unreacted object may remain after process termination, it is not desirable. Moreover, when there is more amount used than the above-mentioned range, since the rate of an impurity that do not participate in the hardening reaction of radiation-curing nature resin, but cost is contained in about [ increasing and being unsatisfactory ] and a resin constituent increases, it is not desirable.

[0040] In the \*\*\*\* binder of this invention, in order to promote the reaction by UV irradiation, in addition to a polymerization initiator, a polymerization initiation assistant may be mixed further. Although a polymerization initiation assistant does not generate a radical even if itself receives UV irradiation, it is matter which has the function which is made to promote a reaction by using together with a polymerization initiator and using, and makes efficient the hardening reaction of ultraviolet-rays hardenability resin. As a polymerization initiation assistant, there are compounds, such as aliphatic series or aromatic amine, sulfones, and phosphines.

[0041] Since the polymerization crosslinking reaction by radiation irradiation advances by radical reaction, it performs the permutation by inert gas, such as nitrogen, helium, and a carbon dioxide, and it is [ 600 ppm or less of oxygen densities ]

more desirable than it is dependent on the oxygen density in an ambient atmosphere to irradiate in the ambient atmosphere preferably controlled to 400 ppm or less.

[0042] Although the adhesion by the \*\*\*\* pressure sensitive adhesive of this invention can be controlled by combination of a \*\*\*\* pressure sensitive adhesive, coverage, extent of radiation irradiation, the additive, moisture regain, etc., it can use 5-3000gf / in 25mm if needed (180-degree exfoliation, exfoliation rate for 300mm/). When adhesion is smaller than this range, it light release past \*\* also as tag paper most used by \*\*\*\*\*, and even if adhesion is larger than this range, degradation of a base material and destruction may take place at the time of about [ that exfoliation takes great energy ] and exfoliation.

[0043] This polyethylene-glycol compound of the rate of the radiation hardenability resin and the bridge formation polyethylene-glycol compound which constitute the \*\*\*\* pressure sensitive adhesive of this invention and which are a principal component is the rate of the 0.5 - 100 weight section to the radiation hardenability resin 100 section in a weight ratio. If the rate of a bridge formation polyethylene-glycol compound is smaller than this range, it will be hard to discover sufficient adhesion and \*\*\*\*\*, and if [ than this range ] more, viscosity will increase rapidly and spreading nature will fall.

[0044] Although the \*\*\*\* pressure sensitive adhesive of this invention is characterized [ big ] by the ability to apply and fix with a non-solvent, it can be diluted and applied by water and the organic solvent if needed. Moreover, drying after spreading does not interfere at all.

[0045] Although the \*\*\*\* pressure sensitive adhesive which carries out a polymerization by radiation irradiation as mentioned above shows the adhesive ability which does not have inconvenience in using it as a \*\*\*\* pressure sensitive adhesive as it is, if it is left for a long period of time, adhesive ability deteriorates and it may be unable to demonstrate sufficient adhesive strength. It is a cause to advance further the polymerization of the radiation-curing nature resin whose unreacted radical kind shut up into the resin constituent which carried out the polymerization of this degradation with the passage of time by radiation irradiation is the constituent of a \*\*\*\* pressure sensitive adhesive. In this invention, it found out that degradation of adhesive ability with the passage of time was sharply improvable by processing the \*\*\*\* pressure sensitive adhesive which carries out a polymerization by radiation irradiation with radical polymerization inhibitor. The unreacted radical kind shut up into the resin constituent can be made to inactivate by performing radical polymerization inhibitor processing. As such radical polymerization inhibitor, the radical polymerization inhibitor generally known, such as dichloro benzoquinones, trinitrobenzenes, nitrosobenzenes, butyl catechols, picric acids, nitro benzoic acids, oxygen and active oxygen, the 2nd copper chloride, the 2nd ferric chloride, halogenation cobalt, diphenyl picrylhydrazyl, a tetraethyl phenylenediamine, KURORU anil, and iodine, can be used. these radical polymerization inhibitor is independent -- it is -- it can use as a solution and water or a solvent can wash after processing further. It is more effective to process with radical polymerization inhibitor anew after radiation irradiation, if it takes into consideration to check the reaction at the time of radiation irradiation and that disassembly of polymerization inhibitor arises at the time of radiation irradiation, although the approach of mixing radical polymerization inhibitor

more than the polymerization inhibitor concentration for resin preservation to the resin constituent which consists of a polyethylene-glycol compound which has radiation hardenability resin and the structure of cross linkage from the beginning is also possible.

[0046] As an approach of applying radical polymerization inhibitor, approaches, such as a blade coat, the Ayr doctor coat, a squeeze coat, the Ayr knife coat, a reverse roll coat, a gravure roll and a transfer roll coat, a bar coat, a curtain coat, a kiss coat, a gate roll coat, and Tab size, are used, for example. Moreover, drying after spreading does not interfere at all.

[0047] The adhesion product using the \*\*\*\* pressure sensitive adhesive of this invention can flush the dust which sufficient adhesiveness is not only shown, but lost the adhesiveness in an instant, for example, it has pasted up on the \*\*\*\* pressure sensitive adhesive front face by washing with water or an organic solvent after use. When it uses for a pressure sensitive adhesive label, it is possible by supplying underwater to exfoliate a label from adherend in an instant. When it exfoliates, a \*\*\*\* pressure sensitive adhesive has the outstanding function in which it does not remain to adherend at all.

[0048] Although the adhesion product using the \*\*\*\* pressure sensitive adhesive of this invention loses the adhesiveness with water or an organic solvent in an instant, after water or an organic solvent evaporates, adhesiveness discovers it again. For this reason, when it uses for a dust picking roll, a dust mat, or a SOL mat, for example, after carrying out fixed period use, polluting a \*\*\*\* pressure sensitive adhesive front face with dust, soil, and dust and easy rinsing removes these pollutants, if it is made to dry, adhesiveness can return and use it repeatedly easily. The adhesiveness which a \*\*\*\* pressure sensitive adhesive does not flow out depending on easy rinsing, and hardly changes to a front can be acquired.

[0049]

[Function] The \*\*\*\* pressure sensitive adhesive of this invention can be fixed at low temperature by spreading and radiation irradiation at a non-solvent, and can discover moderate adhesion. Sufficient adhesiveness is shown as an adhesion product, adhesion is lost with water or an organic solvent in an instant, and an adhesion front face can be washed. After water or an organic solvent evaporates, adhesiveness can be discovered again and it can use as a repeat adhesion product. Even if the coat reinforcement of a \*\*\*\* pressure sensitive adhesive layer is strong and it exfoliates a \*\*\*\* pressure sensitive adhesive from an adherend, a \*\*\*\* pressure sensitive adhesive does not remain to an adherend. Since an unreacted radical kind can be inactivated and too much advance of a polymerization can be controlled after radiation irradiation by work of radical polymerization inhibitor, also after excelling also in the stability of adhesive ability with the passage of time and leaving it for a long period of time, degradation of adhesion is not seen but shows sufficient adhesiveness.

[0050]

[Example] Hereafter, although an example explains this invention in detail, the contents of this invention are not limited to an example. Unless it refuses especially, the section and % show weight section and weight %, respectively.

[0051] The bridge formation polyethylene-glycol compound which is made to carry out the addition reaction of the ethyleneoxide 18000 section to the polypropylene-glycol 2000 section of molecular weight 20000 as an example 1 polyethylene-glycol compound, uses, performs an ester exchange reaction in the dimethyl terephthalic-acid 194 section, considers as a polyethylene-glycol compound, performs gamma irradiation after desiccation and by the cobalt 60, and is made into the purpose was obtained. In the bridge formation polyethylene-glycol compound 100 obtained section, the acrylic-acid dimer 50 section and the N-vinyl formamide 50 section were often mixed as radiation hardenability resin, and the \*\*\*\* pressure sensitive adhesive made into the purpose was obtained. After performing corona treatment to paper of fine quality with a thickness of 100 micrometers as a base material using the laminated paper which prepared the 20-micrometer polyethylene lamination layer, it applied by 50g of coverage/, and m2, electron-beam-irradiation equipment performed electron beam irradiation of 3Mrad(s) in nitrogen-gas-atmosphere mind, and the adhesion product was obtained.

[0052] For the adhesion product obtained in the example 2 example 1, the adhesion product which performed processing by radical polymerization inhibitor was further obtained by drying after applying the toluene solution of 3% of diphenyl picrylhydrazyl.

[0053] The \*\*\*\* pressure sensitive adhesive which may carry out the acrylic-acid dimer 50 section and the N-vinyl formamide 50 section as radiation hardenability resin, may carry out sequential mixing of the 2-methyl-1-[4-(methylthio) phenyl]-2-morpholino propane -1 the 4 sections as a polymerization initiator, respectively, may use a high-speed homogenizer to the bridge formation polyethylene-glycol compound 100 section obtained in the example 3 example 1, distributes, and is made into the purpose was obtained. After the base material performed corona treatment using the same thing as the laminated paper used in the example 1, it was applied by coverage 50 g/m2, performed UV irradiation in nitrogen-gas-atmosphere mind using high-pressure mercury UV irradiation lamp 4 LGT of 120 W/cm, and obtained the adhesion product.

[0054] For the adhesion product obtained in the example 4 example 3, the adhesion product which performed processing by radical polymerization inhibitor was further obtained by drying after applying the alcoholic solution of 5% of tree P-nitrophenyl.

[0055] As an example 5 polyethylene-glycol compound, 20000 \*\*\*\*\*, the phthalic-acid 166 section, and an esterification reaction were performed, the polyethylene glycol of molecular weight 20000 was used as the polyethylene-glycol compound, after desiccation, electron beam irradiation was performed and the bridge formation polyethylene-glycol compound was obtained. The obtained bridge formation polyethylene-glycol compound was ground by the frost-shattering method, and the \*\*\*\* pressure sensitive adhesive which uses as particle size 125 and 100 or 88-micrometer bridge formation polyethylene-glycol compound powder 125 and the thing which has passed the sieve it is [ sieve ] 100 or 88 micrometers, respectively,

and a sieve eye often mixes polypropylene-glycol diacrylate with each bridge formation polyethylene-glycol compound powder as radiation hardenability resin, and makes the purpose was obtained. The weight rate of a bridge formation polyethylene-glycol compound and radiation-curing nature resin is six kinds, 0.3/100, 0.5/100, 1/100, 5/100, 10/100, and 20/100. Corona treatment was performed to KOTIDDO paper with a thickness of 100 micrometers as a base material, each \*\*\*\* pressure sensitive adhesive which performed distributed processing with the high-speed homogenizer was applied by the comma coating machine by coverage 15 g/m<sup>2</sup>, respectively, and the adhesion product which performs electron beam irradiation of 0.5Mrad(s) in nitrogen-gas-atmosphere mind with electron-beam-irradiation equipment, and is made into the purpose was obtained.

[0056] As an example 6 polyethylene-glycol compound, the esterification reaction was performed in 10000 \*\*\*\*\* and the maleic-anhydride 98 section, the polyethylene glycol of molecular weight 10000 was used as the polyethylene-glycol compound, after desiccation, electron beam irradiation was performed and the bridge formation polyethylene-glycol compound was obtained. The obtained bridge formation polyethylene-glycol compound was ground by the frost-shattering method, and the \*\*\*\* pressure sensitive adhesive which uses as particle size 105 and 100 or 62-micrometer bridge formation polyethylene-glycol compound powder 105 and the thing which has passed the sieve it is [ sieve ] 100 or 62 micrometers, respectively, and a sieve eye often mixes hydroxy 3-phenoxy acrylate with each bridge formation polyethylene-glycol compound powder as radiation-curing nature resin, and makes the purpose was obtained. The weight rate of a bridge formation polyethylene-glycol compound and radiation-curing nature resin is six kinds of 5/100, 20/100, 50/100, 80/100, 100/100, and 120/100, respectively. Corona treatment was performed to the transparence polyester sheet with a thickness of 100 micrometers as a base material, each \*\*\*\* pressure sensitive adhesive which performed distributed processing with the high-speed homogenizer was applied by the comma coating machine by 25g of coverage/, and m<sup>2</sup>, respectively, electron-beam-irradiation equipment performed electron beam irradiation of 1Mrad in nitrogen-gas-atmosphere mind, and the adhesion product made into the purpose was obtained.

[0057] As an example 7 polyethylene-glycol compound, the esterification reaction was performed, the polyethylene glycol of molecular weight 2000 was dried in 10000 \*\*\*\*\* and the trimellitic acid 98 section, and the bridge formation polyethylene-glycol compound was obtained. The \*\*\*\* pressure sensitive adhesive which grinds the obtained bridge formation polyethylene-glycol compound by the frost-shattering method, uses as bridge formation polyethylene-glycol compound powder with a particle size of 44 micrometers what has passed the sieve whose sieve eye is 44 micrometers, often mixes hydroxy 3-phenoxy acrylate as radiation-curing nature resin, and is made into the purpose was obtained. The weight rate of a bridge formation polyethylene-glycol compound and radiation-curing nature resin is 10/100. It applied by coverage 25 g/m<sup>2</sup> using the nonwoven fabric sheet of basis-weight 120 g/m<sup>2</sup> which carried out wet paper milling of the acrylonitrile fiber (the Unitika, Ltd. make, 3dx3mm) as a base material, electron-beam-irradiation equipment performed electron beam irradiation of 1Mrad in nitrogen-gas-atmosphere mind, and the adhesion product made into the purpose was obtained.

[0058] For the adhesion product obtained in the example 8 example 7, the adhesion product which performed processing by radical polymerization inhibitor was further obtained by drying after applying the alcoholic solution of 3% of para benzoquinone.

[0059] As an example 9 polyethylene-glycol compound, it reacted in 10000 \*\*\*\*\* and the diphenylmethane diisocyanate 98 section, and the polyethylene glycol of molecular weight 20000 was used as the polyethylene-glycol compound, after desiccation, electron beam irradiation was performed and the bridge formation polyethylene-glycol compound was obtained. The \*\*\*\* pressure sensitive adhesive which grinds the obtained bridge formation polyethylene-glycol compound by the frost-shattering method, uses as bridge formation polyethylene-glycol compound powder with a particle size of 62 micrometers what has passed the sieve whose sieve eye is 62 micrometers, often mixes hydroxy 3-phenoxypropylacrylate as radiation-curing nature resin, and is made into the purpose was obtained. The weight rate of a bridge formation polyethylene-glycol compound and radiation-curing nature resin is 10/100. furthermore, this \*\*\*\* pressure sensitive adhesive 100 section -- receiving -- as a pigment -- a synthetic silica (the product made from the Mizusawa chemical industry --) After mixing Ms. KASHIRU P832 and 3 micrometers of 10 sections of mean diameters, the polyvinyl chloride which has the thickness of 1mm as a base material is used. The \*\*\*\* pressure sensitive adhesive which could use the high-speed homogenizer and performed distributed processing was applied by coverage 20 g/m<sup>2</sup>, electron-beam-irradiation equipment performed electron beam irradiation of 1Mrad in nitrogen-gas-atmosphere mind, and the adhesion product made into the purpose was obtained.

[0060] For the adhesion product obtained in the example 10 example 9, the adhesion product which performed processing by radical polymerization inhibitor was further obtained by drying after applying 2% of copper(II) chloride solution.

[0061] To the bridge formation polyethylene-glycol compound powder with a particle size of 100 micrometers obtained in the example 11 example 6, hydroxy-3-phenoxy acrylate was mixed as radiation-curing nature resin, and methylphenylglyoxylate was often mixed at a weight rate of 10/100/5 as a polymerization initiator, respectively, and it considered as the \*\*\*\* pressure sensitive adhesive made into the purpose. Subsequently, it applied by 15g of coverage/, and m<sup>2</sup>, UV irradiation was performed in nitrogen-gas-atmosphere mind using high-pressure mercury UV irradiation lamp 6 LGT of 120 W/cm, using aluminum foil lamination paper as a base material, and the adhesion product made into the purpose was obtained.

[0062] For the adhesion product obtained in the example 12 example 11, the adhesion product which performed processing by radical polymerization inhibitor was further obtained by drying after applying the alcoholic solution of 5% of p-tert-butyl catechol.

[0063] After carrying out 0.5 section mixing candle power kneading of the glass grain with a mean particle diameter of 5 micrometers to the \*\*\*\* pressure sensitive adhesive 100 same section as example 13 example 1, using the polyvinyl chloride which has the thickness of 1mm as a base material, it applied by coverage 30 g/m<sup>2</sup>, electron-beam-irradiation equipment performed electron beam irradiation of 5Mrad(s) in nitrogen-gas-atmosphere mind, and the adhesion product made into the purpose was obtained.



[0064] For the adhesion product obtained in the example 14 example 13, 2% of N, N, N', and the adhesion product that performed processing by radical polymerization inhibitor by drying after applying the alcoholic solution of N'-tetraethyl-p-phenylene diamine were obtained further.

[0065] It considered as the \*\*\*\* pressure sensitive adhesive which carries out the acrylic-acid dimer 50 section and the N-vinyl formamide 50 section as radiation hardenability resin, and carries out sequential mixing of the 2-methyl-1-[4-(methylthio) phenyl]-2-morpholino propane -1 the 4 sections as a polymerization initiator, respectively, and is made into the purpose at the bridge formation polyethylene-glycol compound 100 section obtained in the example 15 example 1. Subsequently, using the polyvinyl chloride which has the thickness of 1mm as a base material, it applied by coverage 30 g/m<sup>2</sup>, UV irradiation was performed in nitrogen-gas-atmosphere mind using high-pressure mercury UV irradiation lamp 6 LGT of 120 W/cm, and the adhesion product made into the purpose was obtained.

[0066] Only the radiation hardenability resin (mixture of the acrylic-acid dimer 50 section and the N-vinyl formamide 50 section) used for example of comparison 1 example 1 was applied to the same base material as an example 1, the same electron beam irradiation as an example 1 was performed, and it considered as the sample of the example 1 of a comparison.

[0067] The sample of the example 2 of a comparison which performed processing by radical polymerization inhibitor to the sample obtained in the example 1 of example of comparison 2 comparison by drying after applying the toluene solution of 3% of diphenyl picrylhydrazyl further was obtained.

[0068] The radiation hardenability resin (mixture of the acrylic-acid dimer 50 section and the N-vinyl formamide 50 section) used for example of comparison 3 example 3 and a polymerization initiator (they are the four sections about the 2-methyl-1-[4-(methylthio) phenyl]-2-morpholino propane -1) were applied to the same base material as an example 3, the same UV irradiation as an example 3 was performed, and it considered as the sample of the example 3 of a comparison.

[0069] For the adhesion product obtained in the example 3 of example of comparison 4 comparison, the sample of the example 4 of a comparison which performed processing by radical polymerization inhibitor was further obtained by drying after applying the alcoholic solution of 5% of tree P-nitrophenyl.

[0070] The radiation-curing nature resin used for example of comparison 5 example 7 was applied to the same base material as an example 7, the same electron beam irradiation as an example 7 was performed, and it considered as the sample of the example 5 of a comparison.

[0071] The sample of the example 6 of a comparison which performed processing by radical polymerization inhibitor to the sample obtained in the example 5 of example of comparison 6 comparison by drying after applying the alcoholic solution of 3% of para benzoquinone further was obtained.

[0072] The following pressure sensitive adhesives were applied to the same base material as example of comparison 7 example 6 by the thickness of 25 micrometers. The resin constituent which 6:4 came out of the equimolar copolymer and methoxy triethylene glycol monoacrylate of a maleic anhydride / vinyl methyl ether comparatively by the weight ratio, and was uniformly mixed as a pressure sensitive adhesive was used. Electron beam irradiation of 3Mrad(s) was performed in nitrogen-gas-atmosphere mind after spreading, and the sample of the example 7 of a comparison was obtained.

[0073] To the sample of the example 7 of example of comparison 8 comparison, further, after applying 3% of methyl ether hydroquinone alcoholic solution, processing by radical polymerization inhibitor was performed and the sample of the example 8 of a comparison was obtained by drying.

[0074] The sample of the example 9 of a comparison was obtained like the example 7 of a comparison except having set the amount of example of comparison 9 electron beam irradiation to 10Mrad(s).

[0075] Hydroxy 3-phenoxy acrylate was often mixed as example of comparison 10 polyethylene-glycol compound non-constructed a bridge as a polyethylene glycol 2000 (Wako Pure Chem, average molecular weight 2000, 0% of gel molar fractions), and radiation-curing nature resin, and the \*\*\*\* pressure sensitive adhesive was obtained. The weight rate of a polyethylene-glycol compound and radiation-curing nature resin is 10/100. Corona treatment was performed to the transparence polyester sheet with a thickness of 100 micrometers as a base material, the pressure sensitive adhesive was applied by the comma coating machine by 25g of coverage/, and m2, electron-beam-irradiation equipment performed electron beam irradiation of 3Mrad(s), and the sample of the example 10 of a comparison was obtained.

[0076] To the sample of the example 10 of example of comparison 11 comparison, further, after applying the alcoholic solution of 3% of para benzoquinone, processing by radical polymerization inhibitor was performed and the sample of the example 11 of a comparison was obtained by drying.

[0077] The following solvent mold pressure sensitive adhesives were applied to the same base material as example of comparison 12 example 6 by the thickness of 20 g/m<sup>2</sup>. As a pressure sensitive adhesive, the resin constituent which mixed an acrylic pressure sensitive adhesive (Toyo Ink BPS4819), polyfunctional poly isocyanate (the product made from Japanese polyurethane, coronate L), high absorptivity sodium polyacrylate (NIPPON SHOKUBAI make, AKUA rucksack CA ML-20), toluene, and ethyl acetate by the weight ratio 100/1/2/10/10 was used. Hot air drying was carried out for 2 minutes at 95 degrees C, and the sample of the example 12 of a comparison was obtained.

[0078] The following evaluation trials were performed about the sample obtained in examples 1-15 and the examples 1-12 of a comparison. A result is shown in Tables 1-5. In addition, the weight ratio of a polyethylene-glycol compound and radiation-curing nature resin is expressed as a PEG/RC ratio in front Naka.

[0079] (Trial 1 .. Adhesion) The adhesive face of a sample was stuck on polyester film (product made from the diamond foil No. O-100), and it was left under the fixed load for 24 hours, and it cut to 25mm width of face, the tensilon omnipotent hauling testing machine performed 180-degree exfoliation the rate for 300mm/, and adhesion was measured.

[0080] (Trial 2 .. Water detachability) It cut to 25mm width of face, and it invested underwater, and stirred [ the adhesive face of a sample was stuck on the polyester nonwoven fabric, and it was left under the fixed load for 24 hours, and ], and the time amount in which a polyester nonwoven fabric exfoliates from an adhesive face was measured. In addition, even if 100 seconds passed, measurement when not exfoliating was not performed (it was described in front Naka as >100).

[0081] (Trial 3 .. Re-adhesiveness) It dried, after investing the sample underwater and rinsing it for 10 minutes, and it stuck on polyester film on the conditions same with having used for the adhesion trial, and was left under the same load for 24 hours, the tensilon omnipotent hauling testing machine performed 180-degree exfoliation the rate for 300mm/, and re-adhesion was measured. The rate (%) of re-adhesion to the adhesion before rinsing (adhesion of trial 1) was shown in front Naka as an evaluation result.

[0082] (Trial 4 .. With the passage of time adhesiveness 1) When leaving it for two weeks and passing, with the adhesive face of a sample exposed - It considered as the sample of 1, the adhesion trial and the same trial were performed, and adhesion was measured. the adhesion of the passage of time [ as opposed to / as an evaluation result / the adhesion before rinsing (adhesion of trial 1) in front Naka ] -1 -- (%) was shown comparatively.

[0083] (Trial 5 .. With the passage of time adhesiveness 2) after sunlight leaves it for one month in the location which hits well, with the adhesive face of a sample exposed, in order to flush the dust adhering to an adhesive face -- a stream -- it invests in inside for 3 minutes, and, subsequently dries -- making -- passing -- the time - it considered as the sample of 2, the adhesion trial and the same trial were performed, and adhesion was measured. the adhesion of the passage of time [ as opposed to / as an evaluation result / the adhesion before rinsing (adhesion of trial 1) in front Naka ] -2 -- (%) was shown comparatively.

[0084]

[Table 1]

実施例	PBG/RC 重量比	粒径 μm	粘着力 gf/25mm	水 剥離性 (秒)	再 粘着性 (%)	経時粘着性	
						1 (%)	2 (%)
実施例 1	100/100	—	3 2 0	4	9 0	8 4	8 0
実施例 2	100/100	—	3 0 5	4	9 2	9 4	9 0
実施例 3	100/100	—	3 2 5	4	8 8	8 0	7 8
実施例 4	100/100	—	3 0 0	4	8 8	8 6	8 4

[0085]

[Table 2]

実施例	PEG/RC 重量比	粒径 $\mu\text{m}$	粘着力 $\text{gf}/25\text{mm}$	水 剥離性 (秒)	再 粘着性 (%)	経時粘着性	
						1 (%)	2 (%)
実施例 5	0.3/100	125	80	2	90	78	65
	0.5/100	125	110	2	94	80	68
	1/100	125	160	3	96	85	78
	5/100	125	250	3	96	85	80
	10/100	125	490	3	98	88	80
	20/100	125	660	4	98	90	80
	0.3/100	100	120	2	92	78	68
	0.5/100	100	160	2	92	82	70
	1/100	100	200	2	94	86	78
	5/100	100	320	2	95	86	80
	10/100	100	600	3	98	92	80
	20/100	100	700	4	98	92	80
	0.3/100	88	120	1	94	80	70
	0.5/100	88	160	2	94	82	74
	1/100	88	200	2	96	86	80
	5/100	88	330	2	96	88	82
	10/100	88	620	2	98	92	82
	20/100	88	720	4	98	92	82

[0086]

[Table 3]

実施例	PEG/RC 重量比	粒径 $\mu\text{m}$	粘着力 $\text{gf}/25\text{mm}$	水 剥離性 (秒)	再 粘着性 (%)	経時粘着性	
						1 (%)	2 (%)
実施例 6	5/100	105	220	2	95	80	78
	20/100	105	400	3	95	86	80
	50/100	105	520	5	96	90	85
	80/100	105	590	5	98	92	90
	100/100	105	570	8	98	92	92
	120/100	105	300	10	96	84	84
	5/100	100	250	2	96	84	84
	20/100	100	500	2	96	90	90
	50/100	100	580	4	96	96	90
	80/100	100	690	5	98	98	92
	100/100	100	570	8	98	98	92
	120/100	100	400	10	92	92	86
	5/100	62	255	2	96	85	88
	20/100	62	520	2	98	94	90
	50/100	62	600	3	98	98	92
	80/100	62	675	4	100	98	92
	100/100	62	630	6	98	98	92
	120/100	62	500	8	92	92	86

[0087]

[Table 4]

実施例	PEG/RC 重量比	粒径 $\mu\text{m}$	粘着力 $\text{gf}/25\text{mm}$	水 剥離性 (秒)	再 粘着性 (%)	経時粘着性	
						1 (%)	2 (%)
実施例 7	10/100	44	600	2	98	92	92
実施例 8	10/100	44	590	2	98	98	96
実施例 9	10/100	62	250	2	96	94	90
実施例 10	10/100	62	245	2	96	98	96
実施例 11	10/100	100	200	4	94	90	85
実施例 12	10/100	100	200	4	94	94	94
実施例 13	10/100	88	80	2	92	92	90
実施例 14	10/100	88	80	2	92	96	95
実施例 15	10/100	88	75	4	88	86	84

[0088]

[Table 5]

比較例	PEG/RC 重量比	粒径 $\mu\text{m}$	粘着力 $\text{gf}/25\text{mm}$	水 剥離性 (秒)	再 粘着性 (%)	経時粘着性	
						1 (%)	2 (%)
比較例 1	0/100	—	0	—	—	—	—
比較例 2	0/100	—	0	—	—	—	—
比較例 3	0/100	—	0	—	—	—	—
比較例 4	0/100	—	0	—	—	—	—
比較例 5	0/100	—	0	—	—	—	—
比較例 6	0/100	—	0	—	—	—	—
比較例 7	—	—	800	$\geq 100$	0	18	0
比較例 8	—	—	750	$\geq 100$	0	25	0
比較例 9	—	—	450	96	2	80	2
比較例 10	10/100	—	0	—	—	—	—
比較例 11	10/100	—	0	—	—	—	—
比較例 12	—	—	480	84	0	14	0

[0089] Evaluation: Since the sample of the adhesion product produced in the example can be applied with a non-solvent and a non-solvent and hardens by radiation irradiation, it is [ a dry heat zone ] insoluble, and what has sufficient adhesiveness is obtained. Moreover, when a bridge formation polyethylene-glycol compound is ground and it is used as powder with a particle size of 100 micrometers or less, it becomes possible to control adhesion easily. Moreover, changing the mixed rate of radiation hardenability resin and a bridge formation polyethylene-glycol compound can also perform control of adhesion easily. It not only has adhesion, but it exfoliates and these samples can flush the pasted up object which lost adhesion and was pasted up on the \*\*\*\* pressure sensitive adhesive front face by washing with water. Evaporation of water recovers adhesion almost equivalent to the adhesion before rinsing. Moreover, since the bridge formation of a \*\*\*\* pressure sensitive adhesive which once carried out the polymerization by radiation irradiation excluding moisture or a solvent into the \*\*\*\* pressure sensitive adhesive, and a polymerization cannot advance easily more than it, to exposure or sunlight expose [ the \*\*\*\* pressure sensitive adhesive / at the open air ], adhesion can be maintained over a long period of time, and the \*\*\*\* adhesion product which has a good property is obtained. Furthermore, when processing by radical polymerization inhibitor is performed, mothball nature which does not almost have the fall of adhesion can be obtained. Furthermore, the \*\*\*\* adhesion product which has a property with these good is obtained, without being restricted to a base material.

[0090] On the other hand, the above properties cannot be taken out only with radiation-curing nature resin as shown in the example of a comparison. Moreover, also when a bridge is not constructed over the polyethylene-glycol compound to be used, it is in \*\* that it cannot be used for the application of this invention. Moreover, although it is, even if it dries, in order that only the adhesiveness which does not attain to the original adhesion far may be shown or a solvent and an unreacted radical kind may remain into a pressure sensitive adhesive, if it exposes to the open air, the pressure sensitive adhesive which loses adhesion by rinsing will lose adhesiveness, and will not turn into a \*\*\*\* pressure sensitive adhesive.

[0091]

[Effect of the Invention] As shown above, this invention can be applied with a non-solvent and a non-solvent, and what the dry heat zone for hardening is unnecessary, and has sufficient adhesiveness by radiation irradiation is obtained. Moreover, the \*\*\*\* pressure sensitive adhesive of this invention can be rinsed, after exfoliating and flushing the pasted up object adhered to a \*\*\*\* pressure sensitive adhesive front face, if it dries, recovers adhesion and can use it as a repeat adhesion product. A \*\*\*\* adhesion product with the good stability of adhesiveness to the open air expose [ the \*\*\*\* pressure sensitive adhesive / at exposure or sunlight ] with the passage of time is obtained.

[Claim(s)]

[Claim 1] (1) The pressure sensitive adhesive which is characterized by using as a principal component the polymerization object which consists of radiation hardenability resin and a polyethylene-glycol compound which has (2) structure of cross linkage, reacts by radiation irradiation, and is obtained and which can be washed.

[Claim 2] The pressure sensitive adhesive which is characterized by the polyethylene-glycol compound which has the structure of cross linkage being a polyethylene-glycol compound reacted and obtained in a polyethylene glycol and one or more kinds of compounds chosen from the group of polyvalent carboxylic acid, polyvalent carboxylic anhydride, polyvalent-carboxylic-acid low-grade alkyl ester, and multiple-valued isocyanate and in which washing according to claim 1 is possible.

[Claim 3] The pressure sensitive adhesive which is characterized by the polyethylene-glycol compound which has the structure of cross linkage being pulverized by the particle size of 100 micrometers or less and in which washing according to claim 1 or 2 is possible.

[Claim 4] The pressure sensitive adhesive [ a weight ratio with the polyethylene-glycol compound which has radiation hardenability resin and the structure of cross linkage in the pressure sensitive adhesive which can be washed ] which this polyethylene-glycol compound can wash [ given in claim 1 to which the 0.5 - 100 weight section comes out comparatively to this radiation hardenability resin 100 weight section, and it is characterized by a certain thing - 3 any 1 terms ].

[Claim 5] The pressure sensitive adhesive which is characterized by carrying out 0.5-100 weight section content of the organic or inorganic pigment with a mean particle diameter of 1-20 micrometers in the pressure sensitive adhesive which can be washed to the total amount 100 weight section of a polyethylene-glycol compound which has radiation hardenability resin and the structure of cross linkage and in which washing according to claim 4 is possible.

[Claim 6] The pressure sensitive adhesive which can wash a publication in claim 1 characterized by processing this resin constituent with radical polymerization inhibitor - 5 any 1 terms after carrying out the polymerization of the resin constituent which consists of radiation hardenability resin and a polyethylene-glycol compound which has the structure of cross linkage in the pressure sensitive adhesive in which said washing according to claim 1 to 5 is possible by radiation irradiation.

[Claim 7] The pressure sensitive adhesive which can wash a publication in claim 1 to which a radiation is characterized by being an electron ray or ultraviolet rays - 6 any 1 terms.

[Claim 8] The adhesion product characterized by hardening the pressure sensitive adhesive constituent with which a pressure-sensitive glue line uses as a principal component the (1) radiation hardenability resin 100 weight section, and the polyethylene-glycol compound 0.5 - the 100 weight sections which have (2) structure of cross linkage in the adhesion product which has a pressure-sensitive glue line at least on one side on a base material by radiation irradiation.

[Claim 9] The adhesion product characterized by processing this pressure sensitive adhesive constituent with radical polymerization inhibitor after a pressure-sensitive glue line carries out the polymerization of the pressure sensitive adhesive constituent which uses as a principal component the (1) radiation hardenability resin 100 weight section, and the polyethylene-glycol compound 0.5 - the 100 weight sections which have (2) structure of cross linkage by radiation irradiation in the adhesion product which has a pressure-sensitive glue line at least on one side on a base material.

[Claim 10] The adhesion product according to claim 7 or 8 with which a radiation is characterized by being an electron ray or ultraviolet rays.